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Office of Ocean Resources Conservation and Assessment
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Coastal Resources Coordination Branch

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MEMORANDUM

Date: 22 June 1992

To: Cheryl W. Smith, Remedial Project Manager, South Superfund Remedial Branch, USEPA, Region IV

From: Waynon Johnson
Coastal Resource Coordinator, NOAA, Region IV

Subject: Olin Corporation Site, McIntosh, Washington County, Alabama

Review of the subject document for the Olin Corporation Site, McIntosh, Washington County, Alabama was conducted by technical representatives of the Natural Resource Trustee for the National Oceanic and Atmospheric Administration, U.S. Department. Of Commerce. The following comments are offered for your consideration.

Documents Reviewed:

1. *Preliminary Site Characterization Summary, Volumes I and II. Remedial Investigation (RI)/Feasibility Study (FS). McIntosh Plant Site, Olin Corporation, McIntosh, Alabama. April 1992.*

Preliminary Site Characterization Summary:

Two operable units (OU) have been designated for the Olin facility: OU-1 is the plant and grounds area. OU-2 is the Olin basin, including wetlands, on the Olin property and the wastewater ditch leading to the basin.

Groundwater (OU-1) and Surface Water (OU-2) Quality

The major contaminant detected in groundwater from OU-1 was mercury, which exceeded the chronic Ambient Water Quality Criterion (AWQC) for the protection of freshwater organisms by at least a factor of ten (Table 1). Mercury also was found at a concentration of 0.37 µg/L (30x the AWQC of 0.012 µg/L) in one domestic well located south of the Olin property boundary. RCRA quarterly groundwater monitoring results from 1991 and 1992 reported mercury concentrations as high as 270 µg/L. The detection limit for mercury in groundwater was 0.2 µg/L, twenty times the chronic AWQC.

Other inorganic substances found in groundwater at concentrations exceeding their chronic AWQC were cadmium, chromium, copper, lead, silver, zinc and cyanide (Table 1). Lead, zinc and cyanide frequently were found at concentrations exceeding their chronic AWQC by a factor of ten or more. The detection limit for cyanide was 90 µg/L, well above its chronic AWQC of 5.2 µg/L.

A number of chlorinated benzenes were found in groundwater at concentrations exceeding their Lowest Observed Effect Levels (LOEL).

Mercury also was the major contaminant detected in surface water samples from OU-2 in the basin area (Table 1). The highest concentration reported (2.8 µg/L) was over 200 times the chronic AWQC for mercury and exceeded the acute AWQC for mercury of 2.4 µg/L. In addition, cadmium, chromium, lead, zinc and cyanide were found in surface water at concentrations exceeding their respective chronic AWQC values.

Table 1. Maximum concentrations (µg/L) of the major contaminants detected in groundwater samples collected from OU-1 and in surface water samples collected from OU-2 compared to their chronic AWQC. Frequency of detection is presented.

Chemical	Groundwater		Surface Water		AWQC
	Max. Conc.	Frequency	Max. Conc.	Frequency	
Trace Elements					
Mercury	146	18/33	2.8	12/12	0.012
Cadmium	95	4/33	2.2	2/12	1.1
Chromium	719	20/33	11.1	7/12	11
Copper	3430	5/33	ND	0/12	12
Lead	252	28/33	3.8	3/12	3.2
Silver	40.2	4/33	ND	0/12	0.12
Zinc	3060	28/33	444	10/12	110
Cyanide	350	7/33*	36.9	7/12	5.2
Volatile Organic Compounds					
Chlorobenzene	2500	7/33	ND	0/12	50**
Semi-volatile Organic Compound					
1,2-Dichlorobenzene	4000	15/33	ND	0/12	50**
1,4-Dichlorobenzene	4100	15/33	ND	0/12	50**

* The detection limit for cyanide was 90 µg/L, well above its chronic AWQC. Cyanide therefore may have been present more frequently than indicated by listed frequency of detection.

** Criteria have not been developed. The value listed is the lowest observed effect level (LOEL).

ND Not detected

Sediment Quality (OU-2)

The major contaminants detected in surficial and core sediments were mercury, DDT and its metabolites (DDTR), and hexachlorobenzene (HCB). Mercury was detected in virtually every surficial sediment sample collected; the Effects Range-Low (ER-L) was exceeded at every station with detectable concentrations of mercury (Table 2). The highest concentration of mercury in surficial sediments (290 mg/kg) exceeded the ER-L for mercury by a factor of over 1,900. Detectable concentrations of mercury exceeding the ER-L were found as deep as eight feet in the sediments of the basin. Elutriates for EP toxicity testing were reported to have levels of mercury as high as 240 µg/L.

Concentrations of the trace elements antimony, lead, and zinc also were found in sediments of OU-2 at concentrations exceeding their respective ER-L values (Table 2). The highest concentrations were reported in sediments from the basin.

HCB was detected in 10 of 21 surficial sediment samples, and in one of the six subsurface core samples. The maximum concentration (810 mg/kg) found exceeds the upper Apparent Effects Threshold (AET) value 0.23 mg/kg by a factor of over 3500. No ER-L has been established for HCB.

DDT or one of its metabolites was reported in all 21 surficial sediment samples and four of the six core sediment samples (Table 2). The highest concentration of DDT, 4 mg/kg, was reported in sediments from the basin. This concentration is 4,000 times the ER-L of 0.001 mg/kg. Other pesticides, including alpha BHC, beta BHC, delta BHC, gamma BHC, endosulfan I and II, aldrin and heptachlor epoxide, were sporadically detected throughout the basin area.

Table 2. Concentrations (mg/kg) of the major contaminants detected in sediments from the Olin Basin compared to their respective ER-L values.

	Maximum Sediment Concentrations (Frequency)				
Chemical	**Outfall Ditch**	**Discharge Ditch**	**Former Discharge Ditch**	**Basin**	**ER-L**
Surficial Sediments (Upper 6 ")					
Trace Elements					
Mercury	115 (23/25)	4.4 (4/4)	5.8 (6/6)	290 (76/77)	0.15
Antimony	<4.9 (0/4)	<6.23 (0/1)	10.1 (1/2)	24.6 (3/18)	2
Lead	11.6 (4/4)	13.1 (1/1)	19.3 (2/2)	44.2 (18/18)	35
Zinc	89.9 (4/4)	192 (1/1)	116 (2/2)	227 (18/18)	120
Semi-volatile Organic Compounds					
Hexachlorobenzene	1002	970	7.4	265	0.022-0.23*
Pesticides					
4,4'-DDD	0.059	0.073	0.3	1.8	0.002
4,4'-DDE	0.92	0.07	0.29	1.52	0.002
4,4'-DDT	ND	0.038	0.17	4.0	0.001
Sediment Cores					
Trace Elements					
Mercury					
1'	213	NT	1.8	329	0.15
1'-3'	167	NT	44.6	44.6	0.15
3'-5'	337	NT	12.2	70.4	0.15
5'-8'	NT	NT	NT	0.35	0.15

* ER-L value has not been established. The listed values are the Apparent Effects Threshold (AET) values.

Fish Tissues (OU-2)

Twnety three fish species were recorded during electrofishing in the Olin basin. Among these were several NOAA trust species: American eel, skipjack herring, white bass, striped mullet and the hogchoker.

Largemouth bass and channel catfish tissues were analyzed for site-related contaminants. Mercury, HCB and DDTR were the contaminants most frequently observed (Table 3). Mercury was reported in nearly all of the tissues analyzed, the highest concentration of 2.2 mg/kg wet weight was reported in a filet sample from a largemouth bass.

Fish tissues collected during the 1986 survey were analyzed only for mercury. Channel catfish, largemouth bass, rock bass, smallmouth drum, mullet and bluegill filets were all found to contain mercury. Mullet had the lowest concentrations.

DDT or one of its metabolites were detected in all fish tissues. DDT was detected less frequently than DDD or DDE, which were found in every tissue sample. DDD was detected at a maximum concentration of 22 mg/kg in a whole body bass sample. HCB was detected in 17 out of 20 catfish tissue samples and in 19 out of 20 bass tissue samples.

Table 3. Summary of fish analyses. Concentrations in mg/kg wet weight. Numbers in parentheses represent frequency of occurrence.

Species	Mercury	HCB	DDD	DDE	DDT
1991 Survey					
Channel Catfish					
Filet	0.28-0.67 (10/10)	ND-0.58 (7/10)	0.33-3 (10/10)	0.67-5.9 (10/10)	ND-0.36 (4/10)
Whole Body	ND-0.6 (9/10)	0.16-1.8 (10/10)	0.19-11 (10/10)	2.3-17 (10/10)	ND-1 (5/10)
Largemouth Bass					
Filet	0.9-2.2 (10/10)	ND-0.2 (9/10)	0.42-3.8 (10/10)	0.98-5.8 (10/10)	ND-0.47 (6/10)
Whole body	0.47-1.2 (10/10)	0.23-2.5 (10/10)	2.8-22 (10/10)	0.98-5.8 (10/10)	ND-0.47 (6/10)
1986 Survey (Filets Only)					
Channel Catfish	0.7	NT	NT	NT	NT
Largemouth Bass	1.5-1.9	NT	NT	NT	NT
Mullet	0.1-0.2	NT	NT	NT	NT
Smallmouth Buffalo	0.6	NT	NT	NT	NT
Rock bass	1.0	NT	NT	NT	NT
Bluegill	0.8	NT	NT	NT	NT

NT: Not tested
ND: Not detected

Macrobenthic Invertebrate Sampling (OU-2)

Preliminary results suggest that most of the sampling stations in the basin did not support a diverse benthic community. Ephemeroptera (mayflies) and Trichoptera (caddisflies), generally considered intolerant of pollution, were collected from only three stations in the basin and the two stations in the former discharge ditch. Oligochaete collections presented a diverse array of worms in the basin, with some species indicative of more unpolluted habitats. Worms from several stations were observed to have aberrant chaetae, considered by some as indicative of heavy metals exposure. Further analysis of the macrobenthic data is necessary before any definitive statements can be made as to the interpretation of these data.

Comments

The information presented in the preliminary site characterization summary demonstrates that mercury, DDTR and HCB are the major contaminants found at the Olin site. Further, these contaminants are found in the surface water, sediments and tissues of fish at concentrations that constitute a potential threat to NOAA trust resources. Based on available data relating tissue residues in fish to adverse effects, it is probable that mercury and DDTR are adversely affecting fish and other aquatic organisms in the basin, and potentially within the Tombigbee River in the vicinity of the site.

The revised sampling and analysis plan previously submitted proposed additional sampling for OU-1 and OU-2. Please refer to NOAA correspondence of 4 May 1992 for comments and recommendations pertaining to the proposed revisions.

It is recommended that a comprehensive ecological risk assessment be conducted for the Olin site that addresses the Olin basin, wetlands and adjacent areas of the Tombigbee River. To provide data supportive of an assessment, bioassays should be conducted with both sediment and surface water. Sediment toxicity tests should be conducted with a benthic or epibenthic organism, such as the freshwater amphipod, *Hyalella azteca*, or the chironomid, *Chironomus tentans*, or other chironomid species. Bioaccumulation bioassays should be conducted also. Solid phase bioassays could be conducted using the freshwater clam, *Corbicula* spp. Suspended phase and surface water bioassays could be conducted with the fathead minnow and/or *Ceriodaphnia dubia*. Both of these tests are 7-day bioassays that investigate reproductive impairment as well as mortality.

NOAA has commented on work plans previously submitted for the Olin Corporation site. These comments included recommendations believed to be important to the viability and utility of data resultant from subsequent investigations, and for conduction of an ecological risk assessment. Although some recommendations were accepted, others were not. Because NOAA continues to believe these recommendations to be appropriate, we request that recommendations previously made be reconsidered for future site investigations.

Thank you for providing NOAA the opportunity to comment on this site and for keeping me appraised of ongoing activities. I will be happy to discuss any questions or comments pertaining to this review that you may have. My telephone number is (404) 347-5231.